MAGNETIZING STRUCTURE OF MOTOR

FIELD OF THE INVENTION

The present invention relates to a magnetizing structure of a motor, and more particularly to a structure for magnetizing a rotor magnet or a stator magnet of a direct current motor.

BACKGROUND OF THE INVENTION

A traditional direct current motor essentially comprises two major components: a rotor and a stator, one of which is made of permanent magnet and the other is an electric magnet, and the one is disposed circumferentially by the other. Between a rotor and a stator, there exists an air gap. In one case, an inner rotor rotates within a stator; in another case, an outer rotor rotates around an inner stator. A permanent magnet incorporated on either a rotor or a stator directs a magnetic field into the air gap, which interacts with another magnetic field of changing polarity to develop the torque for driving a motor.

Fig. 1 shows a magnetizing structure that is commonly found in a motor. Such structure of an outer-rotor type motor includes a rotor 12 having a magnet cylinder 121 with smooth surfaces on both sides and a stator 11 having a plurality of silicon steel sheets 111 wound by a plurality of winding coils 13. When a current is applied to a winding coil, an electric magnetic field is created to repulse the magnetic field caused from the permanent magnet, thereby the rotor rotates and drives an article such as a fan.

The permanent magnet is usually in a shape of cylinder; therefore, the term "magnet cylinder" hereinafter means a cylindrical-shaped magnet, unless otherwise specified.

Since the inductive magnetic field in the silicon steel sheets 111 on the stator 11 must reach to an adequate level for starting a rotor, the traditional method includes steps of increasing quantities of winding coils and broadening the size of the silicon steel sheets. Since the current flowing in a motor is considerably higher than the rated load current during the period of starting a rotor, a motor can be easily damaged through overheating. Thus, increasing quantities of winding coils is neither practical nor effective. In addition, the silicon steel sheet 111 on the stator 11 is customarily designed to be asymmetric for changing the air gap between the stator 11 and rotor 12 during the period of starting, as can be seen in Fig. 1. Because such type of silicon steel sheet is costly, broadening its size is generally not suitable. A locked rotor condition is common in the customarily used motor, which also requires special attention.

Therefore, the present invention provides an improved magnetizing structure for overcoming the problems described above.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a structure for magnetizing a rotor magnet of a motor, which includes a rotor having a magnet cylinder with a wavy curve surface and a stator having a plurality of silicon steel sheets wound by a plurality of winding coils.

Preferably, the wavy curve surface of the magnet cylinder is one of an inner wavy curve surface and an outer wavy curve surface.

Preferably, the wavy curve surface of the magnet cylinder includes a plurality of curve surfaces having different arc centers.

The plurality of silicon steel sheets can be symmetric or asymmetric; preferably, they are symmetrical.

Moreover, the present invention can be applied to not only the outer-rotor type motor but also an inner-rotor type motor.

According to another aspect of the present invention, there is provided a structure for magnetizing a stator magnet of a motor, which includes a stator having a magnet cylinder with a wavy curve surface and a rotor having a plurality of silicon steel sheets wound by a plurality of winding coils.

Certainly, the wavy curve surface of the magnet cylinder can be one of an inner wavy curve surface and an outer wavy curve surface. The wavy curve surface of the magnet cylinder includes a plurality of curve surfaces having different arc centers. The plurality of silicon steel sheets is preferably symmetrical.

According to a further aspect of the present invention, there is provided a structure for magnetizing a rotor magnet of a motor, which includes a rotor having a magnet cylinder with a lumpy edge and a stator having a plurality of silicon steel sheets wound by a plurality of winding coils. The lumpy edge is a combination of a plurality of concave surfaces and a plurality of convex surfaces.

According to a still further aspect of the present invention, there is provided a structure for magnetizing a stator magnet of a motor, which includes a stator having a magnet cylinder with a lumpy edge and a rotor having a plurality of silicon steel sheets wound by a plurality of winding coils. The lumpy edge is a combination of a plurality of concave surfaces and a plurality of convex surfaces..

The above objects and advantages of the present invention will become more readily apparent to those ordinarily skilled in the art after reviewing the following detailed description and accompanying

drawings, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a sectional view showing a magnetizing structure of motor according to prior art;

Fig. 2 is a sectional view showing a structure for magnetizing of a rotor having a magnet cylinder with an inner wavy curve according to the first preferred embodiment of the present invention;

Fig. 3 is a sectional view showing a structure for magnetizing a rotor having a magnet cylinder with an outer wavy curve according to the first preferred embodiment of the present invention;

Fig. 4 is a sectional view showing a structure for magnetizing a stator having a magnet cylinder with an outer wavy curve according to the second preferred embodiment of the present invention; and

Fig. 5 is a perspective view showing a structure for magnetizing a rotor having a magnet cylinder with a lumpy edge according to the third preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Referring to Fig. 2, the first preferred embodiment of the present invention provides a structure for magnetizing a rotor magnet, which includes a rotor having a magnet cylinder 22 with an inner wavy curve surface 25 and a stator 21 having a plurality of silicon steel sheets 24 wound by a plurality of winding coils 23. The silicon steel sheets 24 are symmetrical, which facilitates mass production to reduce cost. Since the magnet cylinder 22 is manufactured by a molding and sintering process, the shape or size of it can be predetermined and the cost is not high. Owing to the inner wavy curve surface 25, the magnet cylinder 22 directs a magnetic field into the air gap for interacting with the

inductive magnetic field easily to develop the torque and radiate the internally generated heat.

The structure for magnetizing a rotor magnet shown in Fig. 3 is the same as that in Fig. 2, except that a rotor having a magnet cylinder 22 with an outer wavy curve surface 39.

Referring to Fig. 4, the second preferred embodiment of the present invention provides a structure for magnetizing a stator magnet, which includes a stator having a magnet cylinder 40 with an outer wavy curve surface 45 and a stator 41 having a plurality of silicon steel sheets 42 wound by a plurality of winding coils 43. Certainly, the outer wavy curve surface can be replaced with an inner wavy curve surface.

Referring to Fig. 5, the third preferred embodiment of the present invention provides a structure for magnetizing a rotor magnet. The structure in Fig. 5 is the same as that in Fig. 2, except that the rotor has a magnet cylinder with a lumpy edge which is a combination of a plurality of concave surface 52 and a plurality of convex surfaces 51. Certainly, a structure for magnetizing a stator magnet is also suitable, wherein the stator has a magnet cylinder with a lumpy edge which is a combination of a plurality of concave surfaces and a plurality of convex surfaces.

As will be apparent from the above description according to the present invention, the improved magnetized structure for magnetizing a rotor magnet or a stator magnet of a direct current motor is suitable to start a motor easily, radiate the internally generated heat quickly and prevent the locked rotor condition.

While the invention has been described in terms of what are presently considered to be the most practical and preferred embodiments, it is to be understood that the invention needs not be limited to the

disclosed embodiment. On the contrary, it is intended to cover various modifications and similar arrangements included within the spirit and scope of the appended claims which are to be accorded with the broadest interpretation so as to encompass all such modifications and similar structure.